IMAGE PROCESSING SYSTEM

BACKGROUND OF THE INVENTION

The present invention relates to an image processing system, and in particular, to an image processing system wherein an image processing apparatus having an image reading means, an image printing apparatus and an information processing apparatus are connected to each other through a network.

There has been known an image processing system wherein, when a user gives instructions for printing through PC (a personal computer), a print JOB is transmitted from the PC, and an image processing apparatus that has received the print JOB conducts a rasterization processing to transmit the results of the rasterization processing to an image printing apparatus in which image printing is carried out.

For example, in "page description language parallel processing print system" described in TOKKAIHEI No. 6-168087, a print JOB is split into a plurality of sections, and a part of them is transferred to another information processing apparatus on the network (or all of them are transferred, and a range of each allotment is indicated) to rasterize in parallel so as to conduct rasterization processing at high speed.

Further, in "page description language interpreter" described in Patent No. 3168580, there are provided a means to split a print JOB into a plurality of partial files and to transfer them to other information processing equipment connected roughly and a means to collect the sections rasterized by other information processing equipment to compound them, and when participation to rasterization in parallel is requested, a response is made depending on the load to rasterize the partial file when the load allows it.

However, in the conventional technology mentioned above, there have been the following problems.

Namely, in both inventions described respectively in TOKKAIHEI No. 6-168087 and Patent No. 3168580, it has been necessary to split one print JOB into a plurality of partial files (or to judge a splitting range) and to compound the

rasterized partial files in another apparatus having a
rasterization function, which has caused a problem of
complicated software and apparatus. Further, there has also
been a problem that the splitting and compounding processing
result in overhead.

SUMMARY OF THE INVENTION

To overcome the abovementioned drawbacks in
conventional image processing systems, it is an object of the
present invention to provide an image processing system which
requires neither splitting of print JOB nor compounding of
pixel information and can realize high-speed rasterization
processing when splitting rasterization processing to a
plurality of apparatuses by utilizing network surroundings.

Accordingly, to overcome the cited shortcomings, the
abovementioned object of the present invention can be
attained by network systems described as follow.

(1) A network system for processing image data and printing
an image based on the image data, comprising: a plurality of
image-processing apparatus coupled to each other through a
network; and an image printing apparatus coupled to the
plurality of image-processing apparatus through the network;
wherein each of the plurality of image-processing apparatus

includes: a rasterization processing section to apply a rasterization processing to the image data so as to generate first rasterized pixel data; an image data transmitting section to transmit the image data to another image-processing apparatus, in which the rasterization processing is applied to the image data so as to generate second rasterized pixel data; a pixel data receiving section to receive the second rasterized pixel data transmitted from the other image-processing apparatus; and a pixel data transmitting section to transmit either the first rasterized pixel data or the second rasterized pixel data to the image printing apparatus as print-rasterized pixel data; and wherein the image printing apparatus includes: a print-rasterized pixel data receiving section to receive the print-rasterized pixel data, being either the first rasterized pixel data or the second rasterized pixel data, through the network, in order to print the image according to the print-rasterized pixel data.

(2) The network system of item 1, wherein the pixel data transmitting section transmits either the first rasterized pixel data or the second rasterized pixel data, which is acquired earlier as the print-rasterized pixel data completed as a whole, to the image printing apparatus.

(3) A network system for processing image data and printing an image based on the image data, comprising: a plurality of image-processing apparatus coupled to each other through a network; and an image printing apparatus coupled to the plurality of image-processing apparatus through the network; wherein each of the plurality of image-processing apparatus includes: a rasterization processing section to apply a rasterization processing to the image data so as to generate rasterized pixel data; an image data transmitting section to transmit the image data and a completed-part of the rasterized pixel data, rasterization for which are completed by a time when a predetermined condition occurs in mid-course of the rasterization processing for the image data, to another image-processing apparatus; and wherein the image printing apparatus includes: a rasterized pixel data receiving section to receive the rasterized pixel data through the network, in order to print the image according to the rasterized pixel data.

(4) The network system of item 3, wherein, in the other image-processing apparatus, the rasterization processing is applied to a residual part of the image data so as to generate a residual part of the rasterized pixel data; and wherein the other image-processing apparatus transmits the

rasterized pixel data to the image printing apparatus as an

addition of the completed-part and the residual part.

(5) The network system of item 3, wherein the image data

transmitting section transmits the image data and a

completed-part of the rasterized pixel data to a plurality of

other image-processing apparatus.

Further, to overcome the abovementioned problems, other

network systems, embodied in the present invention, will be

described as follow:

(6) An image-processing system, characterized in that,

in the image-processing system, which is so constituted

that a plurality of image-processing apparatus are coupled to

an image printing apparatus, having an image printing means

for conducting a printing operation onto a paper, through a

network,

the image-processing apparatus is provided with a

rasterization processing means for applying a rasterization

processing to image data, an image data transmitting means

for transmitting the image data to another image-processing

apparatus in order to perform the rasterization processing by

the other image-processing apparatus coupled to the network,

a first pixel information receiving means for receiving pixel

information as a result of the rasterization processing by

the other image-processing apparatus coupled to the network

and a pixel information transmitting means for transmitting

pixel information received by the first pixel information

receiving means to the image printing means, and

the image printing apparatus is provided with a second

pixel information receiving means for receiving the pixel

information as a result of the rasterization processing by

the rasterization processing means, and the image printing

means conducts the printing operation based on the pixel

information received by the second pixel information

receiving means.

(7) The image-processing system, described in item 6,

characterized in that the image information transmitting

means transmits either the pixel information as a result of

the rasterization processing by the rasterization processing

means or the pixel information received by the first pixel

information receiving means, which is acquired earlier, to

the image printing apparatus.

(8) An image-processing system, characterized in that,

in the image-processing system, which is so constituted

that an image-processing apparatus is coupled to an image

printing apparatus, having an image printing means for

conducting a printing operation onto a paper, through a

network,

the image-processing apparatus is provided with a

rasterization processing means for applying a rasterization

processing to image data, and an image data transmitting

means for transmitting the image data and pixel information,

for which rasterization processing is already completed, to

another image-processing apparatus in order to conduct a

continuation of the rasterization processing in the other

image-processing apparatus coupled to the network, when a

predetermined condition occurs in mid-course of the

rasterization processing, and

the image printing apparatus is provided with a pixel

information receiving means for receiving the pixel

information as a result of the rasterization processing by

the rasterization processing means, and the image printing

means conducts the printing operation based on the pixel

information received by the pixel information receiving

means.

(9) The image-processing system, described in item 8,

characterized in that the rasterization processing means

conducts the continuation of the rasterization processing,

based on the pixel information, for which rasterization

processing is already completed and which are transmitted

from the other image-processing apparatus coupled to the

network, and the image data.

(10) The image-processing system, described in anyone of

items 6 - 8, characterized in that other image-processing

apparatus, being transmitting objects of the image data

transmitting means are plural.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the present invention

will become apparent upon reading the following detailed

description and upon reference to the drawings in which:

Fig. 1 is a block diagram showing the structure of an

embodiment of an image processing system of the invention;

Fig. 2 is a block diagram showing the structure of

image processing apparatus 3 shown in Fig. 1;

Fig. 3 is a diagram showing the flow chart of the first

example of operations of the image processing system shown in

Fig. 1;

Fig. 4 is a diagram showing the flow chart of the

second example of operations of the image processing system

shown in Fig. 1; and

Fig. 5 is a diagram showing the flow chart of the processing carried out in step (B-6) in Fig. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the invention will be explained as follows, referring to the drawings.

Fig. 1 is a block diagram showing the structure of an embodiment of an image processing system of the invention.

As shown in Fig. 1, the image processing system of the present embodiment is composed of information processing apparatus 1, image printing apparatus 2 and image processing apparatuses 3, 4 and 5, which are connected to each other with network 6. As the information processing apparatus 1, a personal computer, for example, can be used.

The image printing apparatus 2 has therein an image printing means that prints on a blank based on image information resulted from rasterization processing. The image processing apparatuses and the image printing apparatus can also be used after being unified solidly, and in this case, it is possible to realize a function as an image forming apparatus such as a digital copying machine, if there is provided a scanner section that reads images from a

document and outputs them to the image processing

apparatuses.

As the network 6, it is also possible to use an image

processing apparatus of the other through the Internet,

without being limited to those on a small scale such as LAN.

Fig. 2 is a block diagram showing the structure of

image processing apparatus 3 shown in Fig. 1.

Incidentally, the image processing apparatus 3 will be

explained here as a representative, because all of image

processing apparatuses 3 - 5 shown in Fig. 1 are the same in

terms of structure.

As shown in Fig. 2, the image processing apparatus 3 is

composed of network I/F section 10 representing an interface

with network 6, storage section 11 that stores data,

rasterization processing section 12 that conducts

rasterization processing for image data and control section

14 that controls overall operations.

The rasterization processing section 12 has a function

as a rasterizer that rasterizes image data included in print

JOB received through the network I/F section 10 and obtains a

raster image.

Into the image processing apparatus 3, there is

inputted print JOB through the network 6 from, for example,

the information processing apparatus 1. This print JOB is

composed of an image file in which image data are included

and a processing file in which the contents of processing to

be conducted in the course of printing image data are

included, and the contents of processing include, for

example, the pages of the image to be printed, the number of

sets to be printed, whether holes are punched on a blank or

not, whether blanks are stapled or not, and whether plural

images are laid out on a sheet of blank to be printed (image

layout) or not.

Fig. 3 is a diagram showing the flow chart of the first

example of operations of the image processing system shown in

Fig. 1.

When the image processing apparatus 3 receives print

JOB (A-1), the print JOB thus received is transmitted to

image processing apparatus 4 representing another image

processing apparatus (A-2). In this case, IP address of the

image processing apparatus 3 itself (a peculiar address other

than IP address is also acceptable) and additional

information such as a JOB number of the print JOB are

described in the processing file to be transmitted

simultaneously. This additional information may either be a

file separated from the print JOB or be the same one file.

Incidentally, though there is explained an example wherein print JOB is transmitted to image processing apparatus 4 as another image processing apparatus in step (A-2) in the present example, the invention is not limited to this, and it is also possible to arrange so that print JOB is transmitted to a plurality of image processing apparatuses in step (A-2), and rasterization processing is conducted on all or either of the plural image processing apparatuses.

Next, in the image processing apparatus 3, print JOB is transmitted to another image processing apparatus in step (A-2), and then, rasterization processing is conducted for print JOB by rasterization processing section 12 of the image processing apparatus 3 itself (A-3). However, when the image processing apparatus 3 is in the preceding rasterization processing for another JOB, or when rasterization processing cannot be started, the image processing apparatus 3 turns out to be in stand-by for processing.

On the other hand, in the image processing apparatus 4 that has received print JOB from image processing apparatus 3, rasterization processing for the received print JOB is conducted by the rasterization processing section of the image processing apparatus 4 (A-4), and when the rasterization processing is completed, pixel information of

the results of the rasterization processing and a processing
file in which a JOB number of print JOB is described are
transmitted to the image processing apparatus 3 representing
a client which receives them (A-5).

In the image processing apparatus 3, when pixel
information is received in step (A-5), its JOB is confirmed
whether it is the image processing apparatus 3or not in
storage section 11, and when it is not "printing is over"
yet, the pixel information is transmitted to image printing
apparatus 2 for execution of printing and its JOB is made to
be "printing is over" in storage section 11, and
rasterization processing to be conducted by rasterization
processing section 12 of the image processing apparatus 3
itself is cancelled. When its JOB is "printing is over",
pixel information received in step (A-5) is discarded. When
rasterization processing to be conducted by rasterization
processing section 12 of the image processing apparatus 3
itself is completed, pixel information thus obtained is
transmitted to image printing apparatus 2 for execution of
printing and its JOB is made to be "printing is over" in
storage section 11 (A-6).

Fig. 4 is a diagram showing the flow chart of the
second example of operations of the image processing system
shown in Fig. 1.

After the image processing apparatus 3 receives print
JOB (B-1), when the image processing apparatus 3 itself can
conduct rasterization processing immediately (B-2), it
conducts rasterization processing with its own rasterization
processing section 12 (B-3) and transmits pixel information
thus obtained to image printing apparatus 2 to conduct
printing (B-4).

In contrast to this, when the image processing
apparatus 3 cannot start rasterization processing for print
JOB received this time because of the processing of another
JOB or of other conditions, the image processing apparatus 3
transmits the print JOB received in step (B-1) to image
processing apparatus 4 representing another image processing
apparatus (B-5). In this case, IP address of the image
processing apparatus 3 itself and a JOB number of the print
JOB are described in the processing file to be transmitted
simultaneously.

The image processing apparatus 4 that has received
print JOB from the image processing apparatus 3 rasterizes
the received print JOB with its own rasterization processing

section (B-6), and after completing the rasterization

processing, it transmits pixel information representing the

results of the rasterization processing and a processing

file on which a JOB number of the print JOB is described to

the image processing apparatus 3 that is a client. The

image processing apparatus 3 receives the foregoing (B-7),

and transmits the pixel information thus obtained to image

printing apparatus 2 to execute printing (B-4).

Incidentally, the image processing apparatus 4 that is

requested by the image processing apparatus 3 to conduct

rasterization processing can further request another image

processing apparatus to conduct rasterization processing.

Contents of this point will be explained as follows,

referring to Fig. 5.

Fig. 5 is a diagram showing the flow chart of the

processing carried out in step (B-6) in Fig. 4.

The image processing apparatus 4 requested (C-1) by

another image processing apparatus (image processing

apparatus 3 in this case) to conduct rasterization processing

starts rasterization processing with its own rasterization

processing section (C-2).

After completing the rasterization processing (C-3),

the image processing apparatus 4 transmits pixel information

representing the results of the rasterization processing and
a processing file on which a JOB number of the print JOB is
described to the image processing apparatus 3 that is a
client (C-3).

On the other hand, when it turns out to be impossible
(C-5) for the first apparatus to continue rasterization
processing requested by another image processing apparatus
(image processing apparatus 3 in this case) because of the
reason that the first apparatus receives print JOB from image
processing apparatus 1, for example, and of the other
conditions (that the load is so heavy that a prescribed
amount of work cannot be finished within a prescribed period
of time, for example), the first apparatus transmits the
print JOB requested by the image processing apparatus 3, the
pixel information for the partial rasterization processing
which has been finished (which may be either in a unit of
page or on the half way of a page) and a processing file in
which page numbers for the finished rasterization processing
are described additionally, to the further different image
processing apparatus (image processing apparatus 5 in this
case) (C-6) Incidentally, the pixel information, the print
JOB and the processing file may be either in separate files
respectively, or in the same file.

The image processing apparatus 5 that has received the foregoing conducts the rest of the rasterization processing conducted by the image processing apparatus 4, and after completing it, the image processing apparatus 5 transmits pixel information representing the results of the rasterization processing and the processing file in which a JOB number of the print JOB is described to the image processing apparatus 3 that is an original client.

As explained above, the invention makes it possible to provide an image processing system capable of realizing high-speed rasterization processing without necessity of splitting print JOB and of compounding pixel information, when splitting rasterization processing to a plurality of apparatuses by utilizing the network environment.

In the invention, rasterization processing is conducted on an apparatus having light load, for image data included in print JOB, and thereby, speedup of the rasterization processing for the print JOB can be realized as a result. In addition, a load can be split in a plurality of image processing apparatuses each having a rasterization processing section, and resources in an overall image processing system can be utilized effectively.

Disclosed embodiment can be varied by a skilled person without departing from the spirit and scope of the invention.